December

13-14 Architecture Management Group (AMG), IDA, Alexandria, VA

January 1996

30- 1Feb Military Operations Research Society Symposium (MORS) Advanced Distributed Simulation (ADS) Workshop, Williamsburg, VA

March

11-15 Distributed Interactive Simulation (DIS) Workshop, Orlando, FL

June

18-20 Military Operations Annual Research Society Symposium (MORS), Ft. Leavenworth, KS

DMSO Names New Chief Scientist

Dr. Judith Dahmann was named as DMSO's chief scientist in July, 1995. Prior to this, Dr. Dahmann worked as a Program Area Manager for the MITRE Corporation in the area of advanced simulation programs. Dr. Dahmann has over 8 years of experience in defense modeling and simulation and her most notable accomplishments include development of the Aggregate Level Simulation Protocol (ALSP) architecture for distributed simulation and management of the Command Forces (CFOR) program under ARPA's DIS based Synthetic Theater Of War (STOW) Advanced Distributed Simulations (ADS) program. Dr. Dahmann holds a Masters degree from the University of Chicago, and a Doctoral degree from the Johns Hopkins University.

DEPARTMENT OF DEFENSE

MODELING AND SIMULATION (M&S) MASTER PLAN

Under Secretary of Defense (Aquisition and Technology)

## DoD's Modeling and Simulation Master Plan (MSMP)

The Modeling and Simulation Master Plan (MSMP) is in the final stage of formal coordination and approval, and should be signed into effect late this September. The purpose of the MSMP is to implement DoD policy for modeling and simulation (M&S) by establishing objectives, identifying required actions and assigning responsibilities for their accomplishment, across all functional areas within the DoD M&S community.

Representatives from the Department of Defense (DoD) components have thoroughly reviewed the MSMP to ensure that the first version of this living document addresses the most complete possible set of DoD's M&S needs. Subsequent revisions will build on this foundation. The M&S community has long sought a strategic road map and has enthusiastically embraced and followed the Master Plan as satisfying that need. The plan contains the DoD vision for M&S, provides a baseline assessment of M&S capabilities, and sets forth six major objectives targeted to attain the vision. Meeting these objectives provides the focus of efforts of the DMSO divisions, their support teams and contractors.
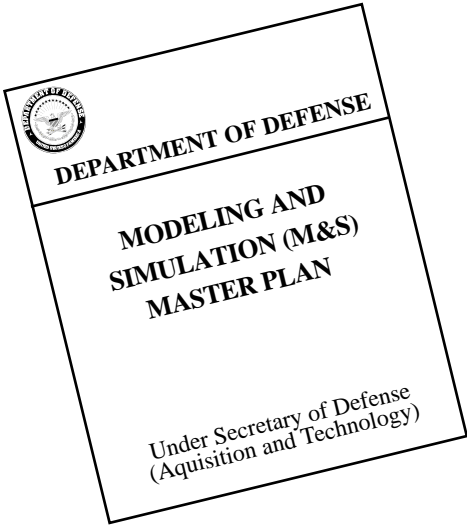
DMSO Hosts NATO DRG Seminar

From September 6 through 8, 1995, the Defense Modeling and Simulation Office (DMSO) hosted the 36th North Atlantic Treaty Organization (NATO) Defense Research Group (DRG) Seminar. The seminar topic was the current experience, future trends and challenges of using modeling and simulation (M&S) to improve military performance. More than 120 representatives of the 16 member nations of NATO attended the seminar held at the Institute for Defense Analyses (IDA) in Alexandria, Virginia.

In addition to presentations of academic papers on member nation's experience with modeling and simulation, DMSO arranged for 16 demonstrations of M&S applications and programs from the fields of military operations, education and acquisition.

Demonstrations included how McDonnell Douglas Helicopter Systems employed M&S to design the cockpit and human interface in the Apache Longbow attack helicopter. Also featured were Rapid Terrain Generation and Simulation-Based Design, both programs developed by the Advanced Research Projects Agency (ARPA).

This was the first ever DRG seminar on the subject of modeling and simulation. Seminar participants and demonstrators alike, saw opportunities for networking and sharing solutions to common problems.

Inside This Issue:

Director's Column

by CAPT Jim Hollenbach, USN

Welcome to the new Defense Modeling and Simulation Office (DMSO) Newsletter. In these pages we will try to keep you updated on the many exciting developments in the world of modeling and simulation (M&S) within the Department of Defense. The M&S community is coming together as a team to support our warfighters with better training, better mission planning and rehearsal, and to support better weapons system design, development, support and testing– all through the use of modeling and simulation.

Central to our efforts is pursuit of the objectives laid out in the Modeling and Simulation Master Plan (MSMP) that guide and focus work throughout DoD. The MSMP is a living document — it will continue to evolve with the M&S community – and it provides unifying guidance for M&S efforts throughout DoD. DMSO investments are tightly focused on achieving the Master Plan's objectives.

It has been most encouraging to see the M&S community coming together to overcome common challenges, and I am excited about the progress we have already made. A primary example of this has been the efforts of the Architecture Management Group (AMG), tasked with developing High Level Architecture (HLA). You can read more about these efforts on page 3 of this newsletter, but the HLA has been likened to the building codes in a city— it doesn't tell you what your house (or simulation) has to look like, but it does tell you how it has to be wired and what kinds of functions it needs to have to "fit in" with other houses on the block. The AMG has the challenge of defining and designing our HLA so that M&S program managers have sufficient guidelines to faciliate maximum interoperability and reuse across DoD but without imposing unacceptable constraints that would keep them from cost-effectively satisfying user requirements.

We have lots of very talented people working very hard to bring alive the dream of having valid, interoperable, reusable, responsive and affordable models and simulations to better train, equip, and employ our Armed Forces. We're having fun making a difference!

Schedule of Events

September 95

18-22 Distributed Interactive Simulation (DIS) Workshop, Orlando, FL

18-29 Joint Warfighting Interoperability Demonstration (JWID) 95, Camp Pendleton, CA; NRaD, San Diego, CA; and other distributed sites

27-28 Architecture Management Group (AMG), IDA, Alexandria, VA

28-29 Verification, Validation & Accreditation (VV&A) Colloquium, Ft.Belvoir, VA

October 95

18 Modeling and Simulation Working Group (MSWG), IDA, Alexandria, VA

November

1-2 Architecture Management Group (AMG), IDA, Alexandria, VA

13-17 Inter-service Industry Training Systems and Education Conference (I/ITSEC), Albuquerque, NM

29 M&S Working Group Meeting (MSWG), IDA, Alexandria, VA

Verification, Validation and Accreditation (VV&A)

The Defense Modeling and Simulation Office (DMSO) has initiated a Verification, Validation and Accreditation (VV&A) program which follows the objectives of the Department of Defense draft Modeling and Simulation Master Plan. Standards and guides are being developed to provide guidance and direction to the Department of Defense users of models and simulations. A draft instruction on VV&A has been written and a recommended practices guide is being developed to address the needs of both managers of VV&A and those who actually perform the work.

Whether used individually or in groups, models and simulations must be credible for their results to be of use. Credibility is measured through verification and validation (V&V) tools and techniques. Verification is the process of determining that a model accurately represents the model developer's conceptual description and specifications. Verification often looks closely at the computer code to ensure that it is correct. Validation is the process of determining the degree to which a model is an accurate representation of the real world from the perspective of the intended uses of the models. Once V&V has been performed, an official determination that the model is acceptable for the specific use is necessary. This determination is defined as "accreditation" and forms the third element of the Verification, Validation and Accreditation (VV&A) process.

Prior to publication, the recommended practices are being applied to selected prototypes which will "test" these practices against both existing and new models. The lessons learned from these tests will be fed back into the final guide version.

DMSO is developing accreditation support to provide continuing technical guidance to users of modeling and simulation. VV&A histories, data and results will be made available in the future through the Modeling and Simulation Resource Repository. This will allow models and simulations to be re-used over time, which reduces the costs of new development. Training seminars under development will instruct practitioners and managers on how to perform VV&A and to define how much effort is necessary for different applications.

A professional technical team has been brought together within the DMSO to define and implement these goals. On-site support includes both practitioner and academic experience, as well as government and industry perspectives. Our VV&A efforts are effectively developed, planned, managed and budgeted with an eye for both current user needs and future opportunities.

All this work is being performed in coordination with and under the review of the MSWG's VV&A technical working group.

Designation, IG/GAO/Congressional Reports, MOUs/MOAs
• Services: Army - MISMA, Navy - DONMSMO, Air Force - AF/XOM, Marine Corps - MCMSMO
• Joint Staff: J-6, J-7, J-8, JWFC
• CINC Liaison: M&S POCs, Simulation Centers
• Gov't outside DoD: DOT, DOJ, DOE, FAA
• Industry (ADPA/NSIA; AMPS; AFCEA; MORS; I/ITSEC)
• Allies
• M&S Working Group/ EXCIMS Coord
• Special Task Forces: M&S Coordination Center, M&S Terminology
• Exercise/Demo Management: NATO Demo, Joint Warrior Interoperability Demo (JWID), I/ ITSEC, Object World Demo
• Entertainment
• DIS User/Sponsor Committee
• DSI Prioritization
• M&S Impact Assessment
• Education
• Public Affairs
Business/Financial Management Division Tasks:
• POM & Budget
• Budget Analysis
• Execution Monitoring
• Contracting Officer Liaison
• Funds Transfer
• Travel/TDY Processing
• Financial Reporting
• Investment Plan
• Business Planning
• Project Review Support

The workshop was designed as a first step in establishing working ties between the two groups. The next step will likely be a National Research Council workshop to identify the best course for cooperative efforts between government (including other agencies as well as DoD) and private industry in the area of models, simulations and gaming.

Modeling and Simulation Information System (MSIS)

The Defense Modeling and Simulation Office (DMSO) sponsors the Modeling and Simulation Information System (MSIS) to serve the modeling and simulation (M&S) community. The MSIS is an internet node that currently runs both gopher and World Wide Web (WWW) environments. It offers users dial-in or direct access and provides them with email and other internet services.

Although the MSIS has been around since 1991, in April of this year it was upgraded and relocated from the Defense Technical Information Center (DTIC) to the DMSO. At that time it also began providing WWW access, allowing M&S related information to be shared throughout the web. The DMSO Home Page can be reached at the Uniform Resource Locator (URL) "http://www.dmso. mil" or through gopher at "msis.dmso.mil". The DMSO homepage provides site addresses and icons, or pointers, to other M&S-related activities on the internet.

The MSIS provides M&S groups and projects increased information sharing capabilities through the use of list servers and web pages. This allows more efficent group information sharing and coordination. Each web page has listed on it a DMSO point of contact (POC) for that specific topic area so that questions can be sent directly to the appropriate individual. The lists of web pages are growing daily. The intent is to eventually cover all relevant M&S topics either through pages on the MSIS or links to web sites throughout the internet.

Here are a few highlights of what is available through the MSIS:

• The Draft DoD M&S Master Plan is available on the system in the Document Library. Comments on the Master Plan can be sent via email to "msmp@msis. dmso.mil".

• The DoD High Level Architecture (HLA) Definition Brief, HLA Interface Specification, and Object Model Template and other documents and briefings are accessible from the Architecture Management Group (AMG) web page.

• The Defense Mapping Agency (DMA) is the first Executive Agent to be appointed for M&S. From the Environmental Representation Technology Working Group (ERTWG) web page you can link to DMA's Terrain Modeling Project Office (TMPO) Homepage at "www.tmpo.dma.gov:8001".

• Subscribe to the DMSO list server **"announce"** by sending an email to: "listserve@msis.dmso.mil" with **"subscribe announce** *Firstname Lastname"* in the body of the message.

• The DoD Information on the system can be obtained through an email message to "msis@msis.dmso. mil". The MSIS Helpline can also be reached by phone at 703-824-3429, or by mail at: Modeling & Simulation Information System Attn: Administrative Support 1901 N. Beauregard Street, Suite 510 Alexandria, VA 22311
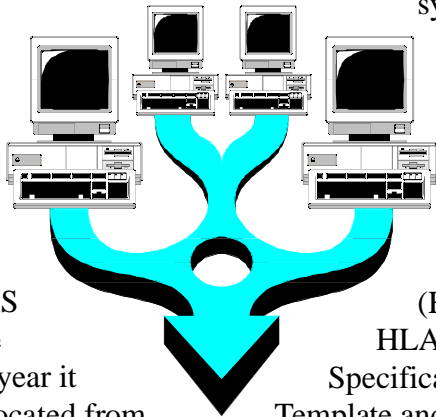
Entertainment Industry Symposium

On Friday August 11, 1995, members of the Defense Modeling and Simulation Office (DMSO), DMSO support staff and other members of the Department of Defense (DoD) modeling and Simulation (M&S) community met with commercial computer game designers, builders and other members of the entertainment industry to see if they could find some common ground to explore mutually beneficial technology. Hosted by the MITRE Corporation, on behalf of DMSO, it was the first such meeting but will likely not to be the last.

The workshop, conceived by Dr. Anita Jones, Director Defense Research and Engineering (DDR&E), was undertaken to begin a dialog and to look for opportunities to leverage advances in commercial games and simulations — particularly in the areas of graphics, audio effects and human interface and immersion.

Entertainment industry attendees included representatives from Virtual World Entertainment, Silicon Graphics, Top Gun Entertainment, MicroProse Software, Inc., and Crystal River Engineering.

To set the stage, the Director of DMSO, Capt. Jim Hollenbach, US Navy, briefed the assembly on the vision and direction of DoD M&S developments. He was followed by DoD researchers doing pioneering work in related fields to provide a glimpse of DoD's needs, interests and work in progress. Then it was the entertainment industry's turn to brief the DoD representatives on what they were developing and what sorts of technical challenges they had had to overcome in the process.

DMSO Organizational Structure and Assigned Tasks

Science and Technology Division Tasks:
• AMG/HLA
• TAP/TARA
• M&S Resource Repository (MSRR): Functional Data Administrator, Multi-level Security, Object World
• VV&A: VV&A Instruction/ Procedures, VV&A Technical Support
• Use of M&S in Acquisition
• TWGs: Architecture, Systems/ VV&A, Human Behavior, Data, Environment
• M&S Info System
• Liaison: DMA, NSA, NRO/ CIO, DISA
• Standards: IEEE, DIS, ISO, NIST, Symbology Standards Mgt Cmtee, SCC
• Technology Assessment/Develop
• Project Support (matrixed)
• Discipline Expertise: Software, Comms/Network, Security, Data, VV&A, Environment (DEEM, MEL, E2DIS, FASTPROP), Computers/Displays, Standards, Ops Research
• Academia Liaison Studies
• DIS Steering Committee

Technology Applications Division Tasks:
• Functional Applications (FWG) Training: JSIMS (WARSIM 2000, NSS, NASM), C4I Initiative, GCCS LES, Real Warrior, NATSIM, Generic Intel Sim, STOW, JTLS, JSTE, Warbreaker, FAMSIM, BFTT, CATT, JTCTS, JWSOL, NACTS, Instrumentation (JFIP, MAIS), MOBA, FAA, JETTA
• Analysis: JWARS, JMASS
• Acquisition: JAST, JCOS, AAAV, JADS, Sim Based Acquisition, Other Programs (F22, V22, SC21, Comanche, AFAS, Army Digitization)
• Ongoing: CMMS, IAC, ALSP Management/Review Panel,Computer Generated Forces (MODSAF), DIA Liaison, ARPA Liaison, DNA Liaison, BMDO Liaison, Entertainment

Operations Division Tasks:
• M&S Policy/Management: M&S Directive 5000.59, Glossary, M&S Master Plan, Exec Agent
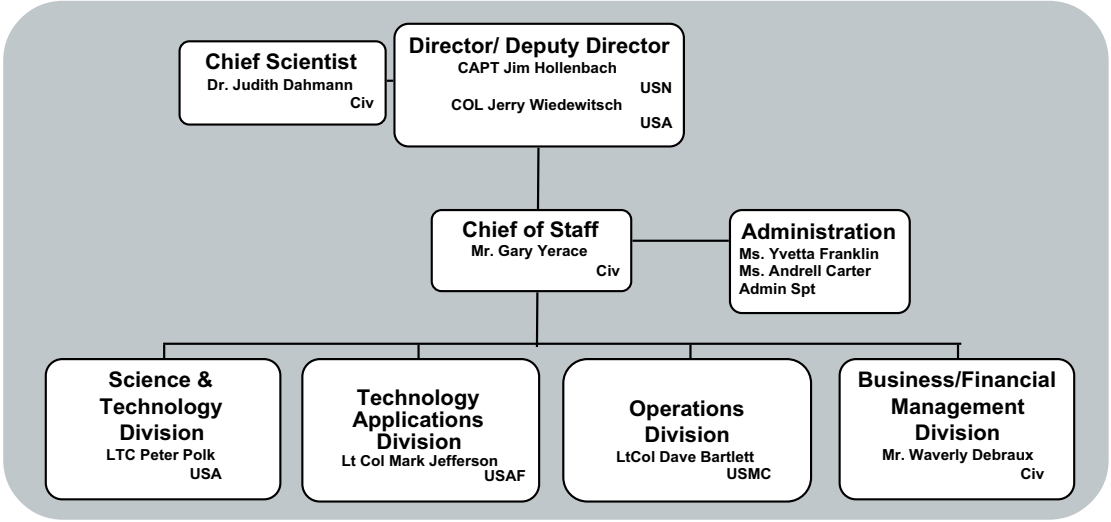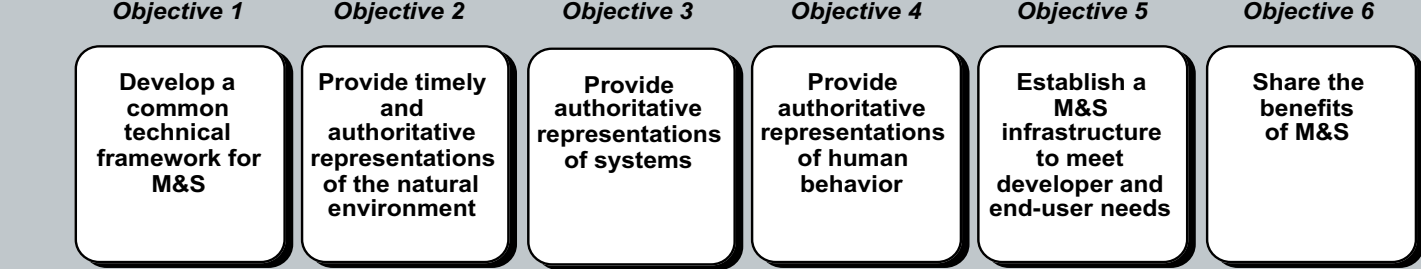
Figure 1

Master Plan contiumued from page 1

This document provides a basis for DoD Components to build on in developing their supporting plans and programs. The plan provides orientation for future M&S support to the four pillars of military capability: readiness, modernization, force structure, and sustainability. The plan focuses on management and M&S technologies that support interoperability, reuse where appropriate, and on the use of standard M&S data DoD-wide. The objectives address common aspects of M&S that will ensure interoperability when achieved.

The majority of DMSO's efforts and project funding is dedicated to developing a common technical framework (Objective 1), providing timely and authoritative representations of the natural environment (Objective 2), and establishing a M&S infrastructure to meet developer and end-user needs (Objective 5). Additionally, DMSO continues to support the standards development process through semi-annual Distributed Integrated Simulation (DIS) workshops and other forums. The *DMSO News* is just one way that DMSO is engaging in community education (Objective 6). Subsequent articles will highlight community efforts to execute the MSMP road map.

Simulation to C4I Initiative

A major goal of the Department of Defense (DoD) Modeling and Simulation Master Plan (MSMP) is achieving comprehensive interoperability among real-world command, control, communication, computers and intelligence (C4I) systems and M&S, allowing operators to "train as you fight" and "take M&S to war."

The Common Operational Modeling, Planning, and Simulation Strategy (COMPASS) is a promising early implementation of the concept. Managed by Cmdr. Dan Donoghue, US Navy, at NRaD, COMPASS provides new services to existing and emerging C4I and M&S systems. Funded by several DoD organizations, including the Navy, Air Force, Defense Nuclear Agency (DNA), the Warrior Preparation Center, the Joint Staff, the Special Operations Command, and DMSO, COMPASS is undergoing a series of demonstrations and field evaluations by operational personnel.

Special Operations Command's Commanders Conference in April was the setting for this year's first COMPASS demonstration. Hosted at Andrews Air Force Base in Maryland, the demonstration showed how remote mission planners from Army, Navy, and Air Force special operations forces and DNA could interact with each other and with remote simulation systems. These interactions were enabled by COMPASS' non-intrusive middleware that allows all systems to "speak a common language."

More recently, the benefits to be gained through COMPASS' ability to link dispersed, heterogeneous systems in a common collaborative environment were highlighted at the NATO Defense Research Group (DRG) Modeling and Simulation Seminar this month in Alexandria. Operators using geographically separated Air Force, Navy, DNA and Special Forces planning systems (AFMSS, TAMPS, CAPS, and SOFPARS, respectively) were linked together for a rapid analysis of plan options using a common collaborative planning application, assisted by a variable bandwidth, commercial-off-the-shelf video-teleconferencing and shared whiteboard capability. The remote participants then followed the progress of various virtual and constructive distributed simulations on their own display screens and were also able to look "over-the-shoulder" of the simulator pilot through a video.

Cmdr. Donoghue is also applying COMPASS capabilities to this year's Joint Warrior Interoperability Demonstration (JWID 95), bringing together a wide range of planning and simulation systems carrying the "COMPASS Inside" sticker.

Cmdr. Donoghue reports that COMPASS services have been officially embraced by the Interservice Mission Planning Working Group as the standard data exchange method for mission planning systems. He expects that designation will lead to a path for operational fielding of COMPASS services near the end of next year. Cmdr. Donoghue also noted continuing work to provide COMPASS as the first Leading Edge Service (LES) for the Global Command and Control System (GCCS).

In another DMSO initiative, at the Warrior Preparation Center (WPC) in Germany under Project Real Warrior, the Air Warfare Simulation (AWSIM) was linked with live Contingency Tactical Air Control System Automated Planning System (CTAPS) operators. By providing an automated link between the operational real world system and the training simulation, the time and manpower needed to move Air Tasking Order (ATO) missions to the AWSIM model were reduced substantially. The Real Warrior interface also allowed CTAPS operators to observe AWSIM events just as they would the real world, by receiving data link aircraft tracks and messages, enhancing the realism of the training experience during the Trail Blazer 95 exercise. Project Real Warrior has been implemented in conjunction with COMPASS, allowing air planners to collaborate over COMPASS-capable system to further refine ATO information in planning the air missions to be flown in the various simulations.

Capt. Jim Hollenbach, US Navy, the director of DMSO and the original director of COMPASS, describes the combined COMPASS/Real Warrior capability as a major step in achieving the "system of systems" capability which Admiral William Owens, Vice Chairman of the Joint Chiefs, has emphasized.

DMSO intends to leverage the efforts of COMPASS and other projects such as ARPA's Command and Control Simulation Interface Language (CCSIL) to develop more extensive, general purpose tools for C4I to simulation interoperability through an HLA-compliant common interface (surrogate) for C4I systems.

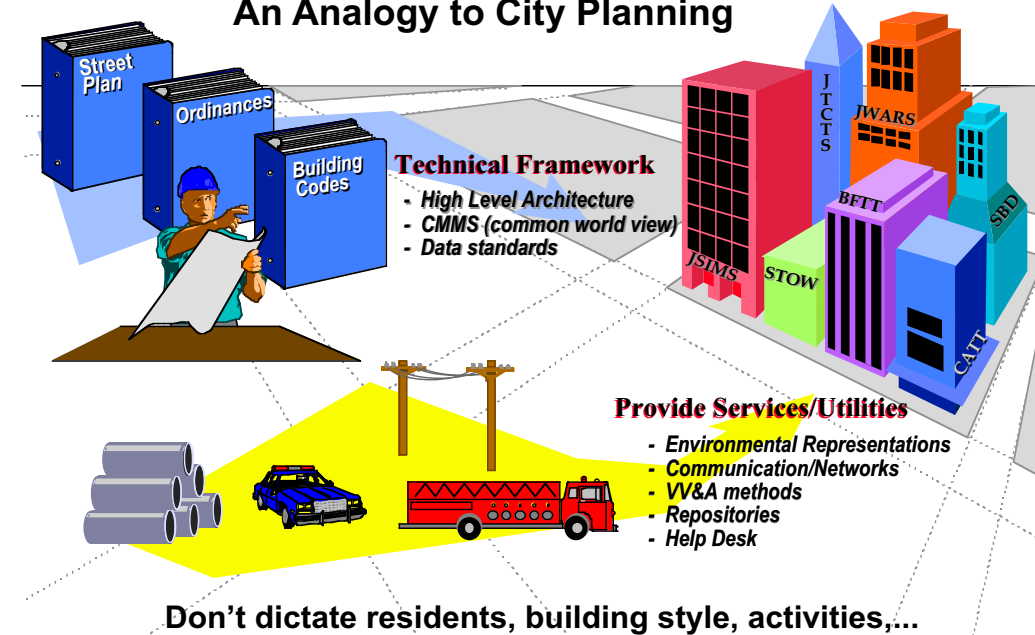## High Level Architecture (HLA) Developments

The Defense Modeling and Simulation Office (DMSO)-chaired Architecture Management Group (AMG) has moved into the prototype phase of the High Level Architecture (HLA) definition process, the development of HLA prototypes by "proto-federations" of like users within the modeling and simulation community.

The AMG is made up of representatives from fifteen major DoD simulation and modeling programs. The AMG is supported by a Technical Support Team (TST). The TST includes personnel from government, Federally Funded Research and Development Centers (FFRDCs), and academia.

The HLA is a Department of Defense simulation architecture that is intended to facilitate interoperability between simulation systems, and promote reuse of simulations and their components. This architecture is being developed according to the HLA Management Plan, a document prepared by the AMG which outlines the program's management structure, technical goals, and development schedule. The management plan and other HLA documents are available to the modeling and simulation community through the DMSO home page on the world wide web.

The HLA Management Plan outlines two phases in the development of the HLA. The first phase was completed on March 31, 1995, when the Advanced Research Projects Agency (ARPA) Program Evaluation Team submitted the initial definition of the HLA to the AMG.

The second phase, the prototype phase of the HLA development process, calls for the HLA to be tested and redefined by users within the DoD modeling and simulation community, as they build a set of HLA-compliant, distributed simulations. The idea is that in using the HLA in a wide variety of simulations, it can be developed for maximum interoperability and reuse. The development process culminates in August 1996, when the baseline definition of the HLA will be specified.

The prototype phase of the HLA development process began with an identification of the critical issues which must be addressed by the HLA. Next, the AMG members were grouped into four prototype federations of simulations ("proto-federations") to address some subset of these issues. These proto-federations have each designed an experimental scenario, and are developing a federation object model to document the information they will exchange within the federation. Each AMG member identified funds for their prototyping work (with DMSO providing some additional funding in some cases), and work is now fully underway on the prototype demonstrations. The HLA critical issues and a description of each of the proto-federations are presented in the appendices of the HLA Management Plan.

For additional information, contact Tom S. Stark, at: tstark@msis. dmso.mil or (703) 824-3459.

M&S Strategy:
An Analogy to City Planning

Technical Framework
- *High Level Architecture*
- *CMMS (common world view)*
- *Data standards*

Provide Services/Utilities
- *Environmental Representations*
- *Communication/Networks*
- *VV&A methods*
- *Repositories*
- *Help Desk*

Don't dictate residents, building style, activities,...